Sharks, skates and rays

Elasmobranchii are one of the main groups of chondrichthyan fishes, next to Holocephali or chimeras (Wilga et al., 2007). Elasmobranchs are further subdivided into Selachii (Sharks) and Batoidea (skates and rays). On a higher trophic level than the 'Active hunters' in this study, elasmobranchs or skates, rays and sharks, play the role of 'Near top-predators'. Elasmobranchs feed on small demersal or pelagic fish, since they are prey to several top predators in the North Sea and Wadden sea but are at a higher trophic level as well.

History/population trend

Throughout their evolutionary history during at least 400 million years, the cartilaginous fishes (Chondrichthyes) in general, and sharks (Selachii) in particular, remained major components of marine communities, having the ability to adapt to varying selective pressures (Cortés, 2000). However, elasmobranchs are considered particularly vulnerable to anthropogenic pressures as their life-history traits result in low rates of population growth (Walker, 1998; Sguotti et al., 2016). To grasp the extent to which humans can effect Elasmobranchii, there have been data reviews and surveys made on the group since the late 20th century. According to the information that was gathered elasmobranch landings have fluctuated between high and low landings since the 1930s, seeing relative stabilization in the years following 1970 (Walker & Heessen, 1930).

North Sea vs Wadden Sea

Both the North Sea and the Wadden Sea are home to a variety of elasmobranch species. However, the Wadden Sea does not contain all the species that the North Sea contains. Examples of species that can only be found in the North Sea are the Basking shark (*Cetorhinus maximus*) and Blue skate (*Dipturus batis*) (Austin et al., 2019; Bom et al., 2022). Nonetheless, this study found more overlap in species between the two seas than difference. Some examples of species that can be found in both seas are: small-spotted catshark (), nursehound (), thornback ray (*Raja clavata*), and smalleyed ray (*Raja microocellata*) (Ellis et al., 2008; Poiesz et al., 2021). No research was found that suggested that species have disappeared or invasive species that have taken hold in either sea.

Sources

Austin, R. A., Hawkes, L. A., Doherty, P. D., Henderson, S. M., Inger, R., Johnson, L., Pikesley, S. K., Solandt, J., Speedie, C., & Witt, M. J. (2019). Predicting habitat suitability for basking sharks (Cetorhinus maximus) in UK waters using ensemble ecological niche modelling. *Journal of Sea Research, 153*, 101767. https://doi.org/10.1016/j.seares.2019.101767

Bom, R. A., Brader, A., Batsleer, J., Poos, J., Van Der Veer, H. W., & Van Leeuwen, A. (2022). A long-term view on recent changes in abundance of common skate complex in the North Sea. *Marine Biology*, *169*(11). https://doi.org/10.1007/s00227-022-04132-w

Cortés, E. (2000). Life History Patterns and correlations in Sharks. *Reviews in Fisheries Science*, *8*(4), 299–344. https://doi.org/10.1080/10408340308951115

Ellis, J., Mancusi, C., Serena, F., Haka, F., Guallart, J., Ungaro, N., Coelho, R., Schembri, T., & MacKenzie, K. (2008). Scyliorhinus canicula, small spotted catshark [Dataset]. In *IUCN Red List of Threatened Species*. https://doi.org/10.2305/iucn.uk.2009-2.rlts.t161399a5415204.en

Poiesz, S. S. H., Van Elderen, T., Witte, J. I., & Van Der Veer, H. W. (2021). Historical trophic ecology of some divergent shark and skate species in the Dutch coastal North Sea zone. *Marine Biology*, *168*(11). https://doi.org/10.1007/s00227-021-03974-0

Sguotti, C., Lynam, C. P., García-Carreras, B., Ellis, J. R., & Engelhard, G. H. (2016). Distribution of skates and sharks in the North Sea: 112 years of change. *Global Change Biology*, *22*(8), 2729–2743. https://doi.org/10.1111/gcb.13316

Walker, P. (1998). Sensitive skates or resilient rays? Spatial and temporal shifts in ray species composition in the central and north-western North Sea between 1930 and the present

day. *ICES Journal of Marine Science*, *55*(3), 392–402. https://doi.org/10.1006/jmsc.1997.0325

Walker, P., & Heessen, H. J. L. (1996). Long-term changes in ray populations in the North Sea. *ICES Journal of Marine Science*, *53*(6), 1085–1093. https://doi.org/10.1006/jmsc.1996.0135

Wilga, C. D., Motta, P. J., & Sanford, C. P. (2007). Evolution and ecology of feeding in elasmobranchs. *Integrative and Comparative Biology*, *47*(1), 55–69. https://doi.org/10.1093/icb/icm029